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ILLINOIS ENGINEER



LORADO TAFT'S "ALMA MATER" ON THE CAMPUS OF THE UNIVERSITY OF ILLINOIS

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THE ILLINOIS ENGINEER, APRIL, 1956—VOLUME XXXII, NO. 4

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Of Interest to I. S. P. E.

PRESIDENT'S MESSAGE

"The moving finger writes and having writ, moves on"—thus wrote Omar Khayyam.

The accomplishments and forward movement of the

Illinois Society of Professional Engineers for 1955-1956 is past history. There is nothing we can do to change the record, except to profit by our shortcomings and probable omissions. The gains and successes we have attained are all accountable to the various Committees and Board of Direction. Many of the State Committees have given generously of their time and effort, and to those faithful

and devoted members I give my deepest and sincerest thanks.

As your Past President, I confess that some of the goals and achievements that should have been attained during 1955-56 were not entirely fulfilled, for which I ask your forgiveness. However, I humbly dedicate my many hours of work and time to the Society, to its future success and attainments.

During the past Annual Convention, new officers, new committees, and many new ideas and programs have been presented for you and the Society for the coming year.

Let us all, as individual members and as chapters, redouble our efforts and rededicate our desires to cooperate, support, and work with the new Officers and Board.

And, at the Annual Convention in 1957, may the "moving finger" be able to write a glowing story of the success and accomplishments of you, your Chapter and your Society.

From the bottom of my heart, I wish to sincerely thank each and every one who has helped make 1955-56 a year of gains and progress.

DWAIN M. WALLACE

I hold every man a debtor to his profession; from the which as men of course do seek to receive countenance and profit, so ought they of duty to endeavor themselves by way of amends to be a help and ornament thereunto.

Sir Francis Bacon

Vox Secretarii

By P. E. ROBERTS, *Executive Secretary*

Board of Direction Enlarged

The Board of Direction, beginning with the first meeting of the 72nd year of the Society on April 14, was expanded in accordance with the amended Illinois Society Constitution. Article VII, Section 2, now reads: "A. One Representative from each Chapter; B. One additional Representative from each Chapter having between 101 and 300 inclusive corporate members; C. One additional Representative from each Chapter for each additional 200 members over 301 corporate members." Chicago Chapter now has three Representatives and three votes; Capital and Champaign County Chapters, two Representatives and two votes each; and Central Illinois Chapter one Representative and two votes; each of the other Chapters, one Representative and one vote. Multiple votes for Chapters might be an incentive to increase corporate Chapter membership.

Functional Groups

Functional groups or groups with a common interest have been proposed for inclusion within the framework of the Illinois Society. To some, this might seem to be a rather rapid step forward but a study of the history of the Society reveals that as recently as 1945 the Society was made up of both Sections and Chapters. The principal difference between then and now is that ten years ago the Sections were interested in technical problems, while today the professional, economic and social problems are such that functional groups will

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spend little or no time with technical problems. Co-operative effort is the most effective, and functional groups will have the opportunity to exert that kind of effort on their mutual problems.

It is not difficult to show that those groups who are not now members of the Illinois Society will have much to gain by their membership in the Society. Increased membership of the Society will be beneficial to both Chapters and functional groups. Functional Groups new in the Illinois Society will gain by the weight of numbers, a permanent office, the immediate attention which can be given to a problem, the personnel who devote their full time to Society affairs, the cross-section of professions and interests among the members of the Board of Direction in fixing policy, the flexibility of the use of material in the magazine, and the continuity of management in public relations, legislative activity, professional status, and other endeavors which are sometimes difficult to achieve in shifting offices. All these advantages to functional groups are in use now and will become available to new groups without a long period of organization and promotion. In short, the management of a society is a full-time professional vocation and not an amateur part-time avocation. By every measure, the inclusion of functional groups within the Illinois Society of Professional Engineers will be mutually beneficial.

Twenty Years Ago

Twenty years ago the Illinois Society celebrated its fiftieth birthday by presenting a plaque to the University of Illinois. The plaque reads: "1886-1936 IN COMMEMORATION OF THE FOUNDING OF THIS SOCIETY AT THE UNIVERSITY OF ILLINOIS." The plaque is mounted on the south wall of the engineering library in Civil Engineering Hall.

In 1936 the Officers of the Society were: President, Paul E. Green; Vice President, W. D. Jones; Past President, G. W. Pickles; Secretary-Treasurer, H. E. Babbitt. The other members of the eight-member Board of Direction were Directors A. S. Bakken and W. B. Walraven, and Chapter Presidents P. S. Sheppard and S. M. Wood. The ILLINOIS ENGINEER was a part of the *Bulletin of the Associated State Engineering Societies*. Two chapters were functioning, Madison-St. Clair and Lake County. The following eight Sections were active and presented technical papers at the meeting: Water Supply; Sewerage; Drainage; Roads and Pavements; Public Affairs; Structural; Surveying; and Electrical, Mechanical and Mining. The ladies had a full three-day entertainment schedule during the Fiftieth Anniversary Meeting.

Miscellany

The baseball season at hand is a reminder that a former membership chairman liked baseball. When he talked in terms of applications for membership in the Illinois Society, he always said, "Get two." The invitation is as good today as it was five years ago—GET TWO—applications, that is.

LETTER FROM BRAZIL

Dear Skeet:

This meeting would have been about the 41st Illinois Society I should have attended. I believe I missed one in 1930 and one more recently. My first was in 1914 in Peoria, and I remember well what a favorable impression the Society made on me at the time. However, my salary of \$1200 per year, paid in ten monthly installments, drove my fist tightly closed and it was not until 1916, when the meeting was held in what is now Civil Engineering Hall, that my predecessor, E. E. R. Tratman, high-pressured me into membership. That proved to be a very high mark or important milestone in my professional life because the Society became my principal avocation from then until I retired in 1954.

My first job of importance for the Society was as Chairman to consider amalgamation with the American Association of Engineers. In those early pre-First World War days, the A. A. E. was a large and influential organization. I can remember the interest, tension, and discussion which our committee report evoked . . . because we recommended against joining and the Society supported the committee's recommendation. In those "good old days" the custom seemed to be to have confidence in committees. The acceptance of the report was in spite of the presence in the meeting of many influential members of both societies, including the late F. H. Newell, who later became national president of A. A. E.

You know, I've sometimes wondered why, as age crept over me, in Society affairs my record of activity or attitude seems to have been too "liberal" or unconservative. I can recall with what favor I looked upon the young upstart N.S.P.E. when it was formed in 1934 and how fast my office and their Board of Direction worked to get us in as Charter Members. We were influential in getting our Society into N.S.P.E. in 1934 before the constitution was ratified, but because we were not represented at the original meeting in the East, the four eastern societies which were there have never seen fit to call Illinois a charter member. Their records do show that we were a member in 1934 and the first State Society admitted that was not present at the original meeting. I can well remember when Dr. David B. Steinman came to our Annual Meeting in East St. Louis—was that in 1935?—and our Society ratified the action of the Board in joining N.S.P.E. At that time, N.S.P.E. was hard up both financially and in personnel. They had the bad judgment to elect me a Vice President and I attended the Annual Meeting in Columbus, Ohio in that capacity. The Society was worse'n broke and needed some sum in the thousands. President Steinman called a secret and closed meeting of the Board of Directors to devise ways and means of raising the money. Now of all the lemons I was certainly one. I'd had a hard time to raise the fare to Columbus—for we used to pay our own expenses to meetings in the early days. Most of the other directors were of the same class financially as the V.P. from

(Continued on page 5)

Some Causes of Water Supply Shortages

By W. J. ROBERTS

Introduction

Practically all Illinois public water supply difficulties encountered during recent years have been blamed either directly or indirectly on the drought. This has been a convenient reason, for few people agree on the definition of the drought. A drought is generally thought of as a period of little or no rainfall, but engineers will probably want to qualify that definition with additions, such as: "a period of low streamflow; a time of low water levels in wells and water supply reservoirs; a time when water supply demands far exceeded the yield." This last thought reflects an important phase of a changing economy, for our growing cities are placing an increasing burden on our water supply facilities far in excess of their designed demands.

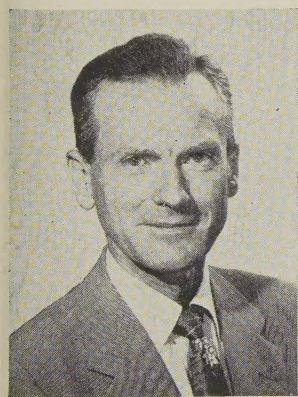
No one yet knows much about the physical aspects of persistent weather features that are prominent at times of drought. Some believe that long-term circulation changes are self-evolving, or that they are somehow connected with sun spots. All we know at present are the general circulation patterns that favor area droughts.

Primary Causes of Water Shortages

Water shortages creep up quietly on communities for many years; droughts generally accentuate them. Often the occurrence of a water shortage has been delayed by normal or above-normal rainfall even though the causes have been growing in strength, ever ready to assert

ABOUT THE AUTHOR

Wyndham J. Roberts, or Jack as he is known to his friends, is an associate engineer with the Illinois State Water Survey. He came to the Survey in August, 1943, after a three-year hitch in the Army Air Corps. Jack graduated from Brown University in 1933 and while earning a master's degree in geology was an instructor in the geology department at Brown. Those in the viewing area of TV station WCIA know Jack as the friendly weather man, "Mr. Roberts." In the Society, Jack is past president of Champaign County Chapter, is an Associate Editor of



W. J. Roberts

the ILLINOIS ENGINEER, and has been loyal and helpful to the Illinois Society in numerous ways. Needless to say, he writes on water problems as an expert, as that is his profession. This paper was presented on March 21, 1956 at the Illinois Section Meeting of the American Water Works Association in Chicago.

themselves at the first opportunity. The chief reasons for most water shortages can be attributed to greater than anticipated population increases, decreases in well capacity, sediment accumulations in reservoirs, and increased water requirements, both domestic and industrial.

Population Increases

Census figures show that most Illinois municipalities have had increases in population from 1940 through 1950. Chicago, Springfield and East St. Louis have registered increases in population from 7 to 9 per cent. Champaign-Urbana has had a 66 per cent increase in population, while Carbondale, another university town, has had a 28 per cent increase. Effingham, a manufacturing town, has shown a 12 per cent increase but some coal mining towns, such as West Frankfort and Johnston City, show decreases in population varying from 8 to 17 per cent. It is interesting to note that these last two municipalities did not experience the severe water shortages that other expanding towns suffered.

Decreases in Well Capacity

Shallow well water supplies, that are locally recharged, can warn communities of their growing inadequacies. Normal rainfall generally provides sufficient recharge for such wells to meet usual pumpage demands. During dry periods lack of recharge permits well water levels to decline and less water is pumped. This warns the community in the form of periods of low pressure in the distribution lines on peak-load days. During protracted dry periods these distribution problems show up more frequently, and the customers are gradually impressed with the inadequacy of their well supply. On the other hand, surface water sources are designed to meet periods of low streamflow. When streamflow is normal or above normal the source can supply many times the demand. In fact it would be possible for municipal use to double or triple in wet years without any strain on the source. The strain would show only on the distribution end of the system.

Sediment Collection in Reservoirs

Natural laws dictate the beginning of destruction of a reservoir as soon as it is constructed. The muddy water which formerly ran unhindered through the valley floor is blocked. The still water is unable to support the sediment it carried in transit and this material falls to the floor of the lake and accumulates.

During the height of the drought in 1954, the Illinois Water Survey made eight special silt surveys of municipal reservoirs in the drought area of central and southern Illinois. Loss in storage capacity due to siltation at some of these lakes was highly significant.

Silt accumulation in the municipal reservoir at Bunker Hill, which was built in 1937, had reduced the reservoir

capacity by nearly 55 per cent. As the original capacity of the lake was only 31 million gallons, the loss of 17 million gallons of storage is serious at this town. At the Carlinville reservoir, which was built in 1939, a 16 per cent loss of capacity due to siltation reduced the reservoir capacity from 559 million gallons to 467 million gallons.

The Johnston City reservoir, built in 1922, showed nearly a 20 per cent loss of storage by 1954. The younger reservoirs showed losses of storage of generally less than 10 per cent.

Actually the Illinois experiences during the recent drought indicated that loss of storage due to reservoir silting was the principal cause of shortage in only five surface water-using communities. It was a contributing cause in many others.

Increased Water Requirements

Both domestic and industrial water requirements have increased greatly since the end of World War II. Many southern Illinois communities are experiencing demands that are four to six times those that occurred in the period from 1930 to 1942. This growth has been due to extension of water service to a larger proportion of the population, as well as increases in population. Increases in demand caused by new water-using devices have not yet taken place to a material extent in the smaller communities. As sales of automatic washing machines, garbage grinders, dish-washing machines, and air conditioners grow, further increases in demand will take place.

Additional Causes of Water Shortages

The majority of the 300 Illinois cities located in the drought area of 1952-55 did not experience serious water problems. One could therefore conclude that present-time engineering practice usually provides for withstanding droughts no more serious than the recent one. However, 41 municipalities encountered water shortage troubles which were associated with management problems or insufficient design data.

Management Problems

Most Illinois communities in the recent drought zone were fortunate in having management that planned ahead and thus prevented water shortages. In a few instances needed waterworks construction may have been delayed for lack of public approval. Some water departments suffer because of inability to attract adequately qualified operating personnel on a permanent basis. Then there are deficiencies involving avoidable increases in water use such as leaks in water mains and lack of water meters. In several cases water rates have not kept pace with the increased cost of maintenance. The problems are part of the broader one of cities and villages trying to operate on inadequate revenues.

Design Data

The 1952-55 drought has shown that some water systems failed to meet the demands of extreme dry

weather conditions due to insufficient design data. Among the factors that may have caused failures are: the rate of reservoir siltation; lack of adequate precipitation records; absence of streamflow history; or inadequate evaporation information. Hydrologic data increase in usefulness with time. It takes many years of *continuous* observations to develop good precipitation and streamflow records. The Illinois State Water Survey and similar organizations are constantly adding to the storehouse of hydrologic knowledge and making the data available for engineering use and planning.

Siltation

Mention has already been made of the Illinois Water Survey's nationally-recognized program for obtaining information on reservoir silting. Until recently, reservoirs were constructed without full regard to soil and water relationships. Little was done to hold the topsoil on the land instead of letting it accumulate in reservoirs. The County Soil Conservation Districts are at work on this job, but in the meantime the designer must use existing reservoir survey data to keep the rate of sedimentation to a minimum.

Precipitation Records

Rainfall data deficiencies result from lack of sufficient measurements and from difficulties in processing the data already collected. The Illinois Water Survey's modern punch-card method of recording and processing weather information is making available precipitation and other meteorological data in ready form for analysis.

Streamflow Records

The recent drought emphasized the need for more streamflow information. As rainfall deficiencies increased, rainfall data became less important than streamflow in evaluating the severity of water shortages. There were many instances of rains over watersheds in the drought zone that produced no runoff into the reservoirs. The dry ground absorbed all the moisture, leaving little or none for runoff. Such rains may have aided agriculture but they added nothing to the reservoir capacity except the rain that fell directly on the water surface. The program for obtaining streamflow data and the establishment of cooperative arrangements between the state and cities that have surface water reservoirs is desirable and is being expanded to overcome this deficiency.

Reservoir Evaporation and Control

During years of normal temperature and precipitation, the loss of moisture from water surfaces in a large part of Illinois exceeds 35 inches annually. Water evaporated from a reservoir in extended dry periods may exceed many times the municipal pumpage. A reduction in evaporation loss would be equivalent to increasing the storage. Preliminary data from one Illinois Water Survey project suggests that evaporation may be retarded 30 per cent.

Conclusions

In many instances it is difficult to attribute the cause of a water shortage to a single factor. Often several factors collectively create difficulties. One fact stands out: our modern economy cannot tolerate water shortages. In order to meet the squeeze between water supply and demand considerably greater attention must be given to the causes and cures of water supply shortages.

LETTER FROM BRAZIL (Continued from page 2)

Illinois. I can remember how each of us tried to get behind the other fellow when the President's eye came our way. The upshot of the fund-raising scheme was, I believe, that the President (Steinman) raised practically all of it from his own pocket. Whether or not it was ever returned is probably not even in the record.

Am I correct in my recollection that Dr. Steinman was severely criticized for activities in N.S.P.E. and he felt that for the good of the organization he should be less prominent in it? I do feel this about him, if he was not the father and founder of the organization, he was certainly its savior, for it would never have pulled through its early years without his strong, guiding and propelling hand. One advantage I had through my activities in I.S.P.E. and N.S.P.E. in those days was my contacts with men such as Dr. Steinman, and the rugged and indefatigable workers for registration in Illinois, the campaign for which was in full swing at the same time. I'll not start reminiscing about that, but I can remember some very tense incidents which can now be laughed off. For example, can you blame Titus LeClair for looking on me with great suspicion because I was the Secretary of an organization of which he had never heard and therefore felt was beneath his trust? At the Legislative Subcommittee meeting in Chicago, he publicly called me a liar (with a table between us) and he and I have become fast friends and he is an active and influential member of I.S.P.E., I.S.E., and W.S.E.

That's enough of old times. I wanted to mention also how as I grew older I became so radical as to wish to put the Society on a solid financial foundation, but that was so relatively recent that it might open old sores. The most radical thing I did for the benefit of the Society was to retire at a ripe old age.

'Tis funny down here how the activities of this job seem to offer almost a new lease on life. At "home," they've put us on the shelf. Here, life is strenuous, active, exhilarating, and the job is challenging. You well know how vigorous is a traveler's life. You stood it for many years. This one keeps Elma and me on the jump always and since travel is 100 per cent by air, it's fast. I've learned a few tricks since arriving here and am able to keep the early morning starts, or all-night flights, to a minimum. Those are the ones that really are trying. On the timetable it looks so reasonable to see—shall I say—plane leaves at 8 a.m. What does that mean? If it leaves from the International Airport at Galeo

(pronounced galleon) passengers must check in at 7:00 a.m. or stand to lose their reservation. It takes one hour from here to the airport so I have to leave at 6:00; to leave at 6:00 all packed up with breakfast, I have to get up about 4:45, so-o even an 8:00 a.m. start means early rising.

It's time to quit, but I've enjoyed writing. Tell the boys hello for me. Regards to Rob Roy and tell him to knock loud with his pipe and to play good tricks—and best of all to my man friends whom I'll miss.

Regards,

H. E. BABBITT

Rio de Janiero, Brazil

March 11, 1956.

One Way to Interest More Young People in Engineering Careers

By ROBERT M. ROY

There seems to be a correlation between the interest in mathematics in high school and the number of high school graduates who enter engineering college. There are available records to show that engineers became interested in the profession first through their contact with a strong high school mathematics teacher. Rob Roy, Chairman of the Publicity and Public Relations Committee, has been interested in helping to solve the shortage-of-engineers problem for some time. He tells us the way the problem is being met in Aurora. The encouragement of mathematics teachers similar to Mr. Guy Runniger of Aurora should spread over the State of Illinois. Much recognition is given the successful basketball coach; like recognition should be extended to the "engineering student coach." Mr. Roy's lucid account follows.—EDITOR.

"Shortage of engineers"—like the subject of the weather—everyone is talking about it but, etc., etc.

With little publicity, a graduate civil engineer, a high school mathematics teacher in the East High School of Aurora for the past thirty years has been working along his own theory of a way to encourage high school students to become engineers.

Twenty-five years ago Guy Runniger noticed a fellow-teacher in the school making weekly tours of the factories and industries in and around Aurora with a bus load of his mechanical drawing pupils. C. I. Carlson, a mechanical engineer and now a professor in the Chicago unit of the University of Illinois, seemed to think that if his students could actually see the results of the draftsman's effort in practical work, it would have the good effect of demonstrating the real need or necessity of the profession.

Mr. Runniger's initial introduction of the combi-

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nation of mathematics with the profession of surveying to the school authority resulted in a flat refusal, so he continued to teach his classes mathematics without the outside assistance. However, with a change in the school administration, he again made his suggestion and the new superintendent, Dr. John Gates, readily saw the advisability and authorized a two-year trial with the result that the combined course was included in the school curriculum.

In a talk before the DuKane Chapter of the Illinois Society of Professional Engineers, the civil engineer and mathematics teacher held his fifty or sixty listeners' attention for nearly two hours, citing illustrations of the good which he believed resulted from the elementary surveying course he taught in connection with his mathematics. Eight of his students, now licensed engineers by the State or engineers-in-training, were in attendance and without exception testified to "Pop's"—that's the "old timer" student's name for Mr. Runniger—idea of lending encouragement to the study of mathematics.

All students in high school cannot be termed natural mathematicians or cannot even be said to become future engineers. However, as they labor through fundamentals of higher arithmetic and elementary algebra, it is easily observed by the teacher the many shortcomings of the teenagers. Every problem cannot be made into a solution for practical usage. However, if these young men and young women can be made to have an understanding of what is in the end going to be a practical accomplishment, their interest in the subject is immediately aroused. And if this spirit of arousement is strong enough, it can create an incentive in the students' minds of perseverance and ultimate accomplishment."

Mr. Runniger's description of the eagerness, resulting in a new hold on the apparently dry subject of mathematics; the opportunity to hold the end of a chain and be responsible for a part in this problem of plane surveying, was both interesting and amusing. Something

like the little boys who play fireman or policeman. That is where they get the idea of desiring to have a part in life's accomplishment. To describe what is to come after his or her four years of college work and possibly another three or four years of apprenticeship becomes considerably easier for the younger minds to grasp.

The medical profession is not confined entirely to the work in the operating room. Neither is the engineering profession restricted to algebraic equations. If such were the case, many of the medic students would have given up before they got started, not because they did not want to be a medical doctor, but they could not "swallow" the scenes of an operating room.

"My aim is to give the high school students an insight into the engineering profession and to impress on them that surveying is 100 per cent of the work required. It is the hardest hurdle to get over, but let us take the hurdle in an easy stride. Proper preparedness and a desire to be mathematically inclined can be incurred in the minds of the youth providing it is done early enough in life. Not, however, if it is delayed until the youth's junior year in college." This seemed to be the philosophy of the engineer-teacher Runniger. His quotation of a long list of students who have made a success of engineering is reason for him to feel he has the correct answer and has earned him the title of "Aurora's Daddy of Engineers."

A retired Engineer has confessed to us that he is a full-fledged member of the "Honey-Dew" Club. When we asked what kind of an organization it is, he explained that it is made up of retired men who hang around their homes and are constantly hearing: "Honey, do this" . . . and "Honey, do that."

And so it is, moans a young Pipe Pedlar, that while we were striving to keep the wolf from the door, the stork sneaked down the chimney.

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COVER PICTURE

The picture on the cover is a view of Lorado Taft's well-known "Alma Mater" group on the campus of the University of Illinois. The re-location of this work of art has been widely discussed on the campus. Many think that the fine piece of sculpture should be displayed in a more prominent location than its present spot behind the University Auditorium.

Today the emphasis is on recruitment of engineers. High school seniors are now thinking about college. The University of Illinois College of Engineering enrollment has been steadily increasing. However, the demand for engineering graduates has run far ahead of the supply. For these reasons, it seems appropriate to focus your attention on education.

Use of this space is limited to members and associates of the Society. This is a dignified and excellent way to let engineers know that your firm can always accept another account. The price is very reasonable. A card or letter to the Secretary, 614 East Green Street, Champaign, Illinois, will bring full details.

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The cost of living correction factor to be applied to the I.S.P.E. Schedule of Minimum Fees and Salaries is based upon the Consumer Price Index of the 1947-49 average as determined by the Bureau of Labor Statistics. On the 1947-49 base the correction factor for February, 1956, is 114.6.

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Asst. Field Engr. 52. 12 yrs. asst. field engr. resp. for 5 men layout for constr. and coordinating work of prime and subcontractors. Made surveys and set up grid system and base lines. \$6500. West. 463 PE

Office Engr. C.E. 27. 3½ yrs. assoc. res. engr. on projects such as analysis of ore bridges, observer on foundation pile tests, determine resistance. 13 mos. prepared design for rectors of reinforced concrete. \$7200. Chicago. 464 PE

Designer. M.E. 37. 10 yrs. carry out res., dev., and design of pneumatic controls, devices, then charge of liaison engrg. 3 yrs. designed products for mfg. of cast iron drains and fittings. \$8500. Chicago. 465 PE

Process Engr. 44. 16 yrs. engr. to estim., des. and follow product thru production for stampings and small assemblies. Good in tool and die design. \$8500. Midwest. 466 PE

Plant Engr. M.E. 48. 18 yrs. resp. for maint., drftg. dept., costs and des. of all engrg. projects of edible products. 3 yrs. design, estimates and supv. drftg. for fabricator. \$11,000. Midwest. 467 PE

Ch. Process Engr. M.E. Age 52. 4½ yrs. charge of production and processing glass eqpt., 6½ yrs. charge of engrg., dev., des. of paper, metal working and food machy. \$9800. Northwest. 468 PE

Ch. Engr. M.E. 40. 10 yrs. resp. for engrg. serv., product dev., special machy. des., lab. res., and constr. for consulting engr. \$10,000. Chicago. 473 PE

Gen'l. Mgr. E.E. Age 45. 16 yrs. resp. for res., des., dev., drftg., production engrg. and constr. for electronic mfg. 5 yrs. sales mgr. on office machine sales. \$15,000. Midwest. 469 PE

Ch. Engr. 30. 10 yrs. ch. engr. layout and des. pneumatic conveyors, mech. component eqpt., pattern and casting des. Supv. drfts., design and estm. Ind. cleaning eqpt. and asst. shop foreman. \$8500. Chicago. 470 PE

Ch. Eng. M.E. Age 38. 8 yrs. ch. mech. and elect. engr., resp. for engrg. and drfts. on piping systems, heat transfer and boiler room eqpt. 2 yrs. Sr. Mech. drafts. for refinery. \$12,500. Midwest. 471 PE

Designer. Aero. Engr. 36. 14 yrs. des. rigid and flexible pneumatic ducting, aerodynamics engr. in des. of electronic eqpt. Instal. preliminary des. layout for power plant. \$6500. Midwest. 472 PE

Ch. Engr. M.E. 49. 17 yrs. charge of mach. des., dev., purchasing and production control depts. Design foundry and production eqpt. \$17,000. Midwest. 474 PE

Sales Engr. C.E. 30. 4½ yrs. resident engr. on hwy. 6 mos. minor des. on bridge structures. \$6600. Midwest. 478 PE

POSITIONS AVAILABLE

Production Engr. M.E. or I.E. Age: 22-50. 1 yr. exp. production of high volume lines. Know: production methods. Duties: Factory engr. on production of electro-mech. control devices. For Mfg. of controls. Sal.: \$6000-\$9000. Loc.: Illinois. Employer will negotiate the fee. C-4732

Sales-Industrial Rolls. Age: to 45. Know: Ind. rolls, rubber. Duties: charge of industrial roll div., rubber, sales over national organization. Traveling car furnished. For Mfr. of rubber rolls. Sal.: \$10,00-\$12,000. Loc.: Chicago. Employer will pay the fee. C-4797

Lab. Dev. Engr. Degree. Know: Foundry operations. Duties: dev. program for use of carbon dioxide in making of foundry ores, primarily lab. work., some trips to foundries. Will also provide tech. serv. to salesmen and customers and dev. other uses for CO. For Mfr. of Ind. gas. Sal.: \$6000-\$7500/yr. Loc.: Chicago. Employer will pay the fee. C-4806.

Chem. Sales-Lubricants. Chem. or Ch. E. Age: to 45. 3 plus yrs. exp. in selling lubrs. to steel rolling mills. Know: lubricants. Duties: Selling line of lubricants, cutting oils and allied products to rolling mill and other industrials. Car supplied. For Mfr. of

oils Sal.: \$7000-\$10,000. Loc.: Chicago. Employer will negotiate the fee. C-4808

Engr. Asst. C.E. Age: 21 plus. 1-2 yrs. exp. in municipal engr. field office. Duties: Field, office on municipal engr. except. no sewage treatment or water treatment. No traveling. For a municipality. Sal.: \$5500-\$6300. Loc.: 40 mi. No. of Chicago. Employer will negotiate the fee. C-4715

Field and Office Engr. C.E. Age: 21-45. Min. 2 yrs. exp. in C.E. work. Know: sewer and street drainage and constr. Duties: Field and office work in the des., layout and inspection of streets. No traveling. Sal.: to \$5,562. Loc.: Illinois. Employer will negotiate the fee. C-4728

Quality Control Engr. M.E. or I.E. Age: 25 to 50. 2 plus yrs. exp. insp. Know: Quality control methods. Duties: resp. for planning of quality control procedures for fabricated parts, purchased parts and assemblies for electro-mech. control devices. For Mfr. of controls. Sal.: \$7000-\$9000. Loc.: Illinois. Employer will negotiate fee. C-4738

District Sales-Bldg. Matls. Age: to 50. 3 plus yrs. exp. in sales-mgmt. in bldg. matls. Duties: Supv. district sales force selling bldg. matls. (other sand and gravel) to archs., engs. and contractors. Some travel. Car req'd. For Distr. of bldg. matls. Sal.: \$10,000-\$15,000. Loc.: Chicago. Sal. plus bonus and exp. Employer will pay the fee. C-4759

Asst. Assoc. Editor. E.E. pref. Age: 25-35. Rec. grad. or better with proven ability in writing. Know: power distr. Duties: write original stories based on field trips. edit contributed articles. cover newsworthy engrg. events and meetings. 25% travel. For Publisher of trade paper. Sal.: to \$8500. Loc.: Mich. Employer will pay the fee. C-4762

Ch. Ind. Engr. M.E. or I.E. Age: 30-40. 5 yrs. exp. hvy. on tooling. Know: incentives, time studies, machine shop. Duties: supv. of 15 men dept., resp. for incentives, time study, eqpt. purchase and tool design. Hvy. eqpt. non-boring mills, turret lathes, engine lathes, etc. Rare traveling. For heavy eqpt. drills, compressors, oxygen, generators. Loc.: Indiana. Sal.: \$7500-\$10,000. Loc.: Indiana. Employer will pay the fee. C-4763

Industrial Engr. Degree pref. Prefer at least 2 yrs. exp. but will accept less. Know: Industrial engrg., design for cost. Duties: Design and dev. of mfg. methods for lower cost. For Machy. Mfr. of canning machy. Sal.: \$6500-\$7200. Loc.: Illinois. Employer will pay the fee. C-4757